

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
30 June 2005 (30.06.2005)

PCT

(10) International Publication Number
WO 2005/059913 A1

(51) International Patent Classification⁷: **G11B 20/00**,
H04H 1/00

(21) International Application Number:
PCT/EP2004/010222

(22) International Filing Date:
13 September 2004 (13.09.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
03090431.2 11 December 2003 (11.12.2003) EP

(71) Applicant (for all designated States except US): **THOMSON LICENSING S.A.** [FR/FR]; 46 Quai A. le Gallo, 92100 Boulogne- Billancourt (FR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **BAUM, Peter, Georg** [DE/DE]; Am Gutspark 32, 30539 Hannover (DE). **VOESSING, Walter** [DE/DE]; Remarqueweg 23, 30455 Hannover (DE).

(74) Agent: **HARTNACK, Wolfgang**; Deutsche Thomson-Brandt GmbH, European Patent Operations, Karl-Wiechert-Allee 74, 30625 Hannover (DE).

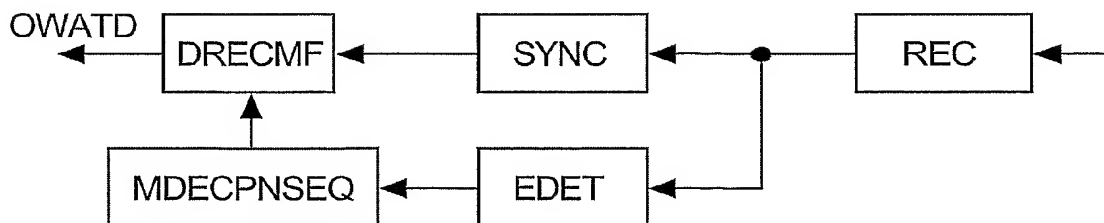
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD AND APPARATUS FOR TRANSMITTING WATERMARK DATA BITS USING A SPREAD SPECTRUM, AND FOR REGAINING WATERMARK DATA BITS EMBEDDED IN A SPREAD SPECTRUM



(57) Abstract: Spread spectrum technology and the related inserted or added information signal can be used for implementing watermarking digital audio signals. A known processing for retrieving at receiver or decoder side the watermark signal information bit from the spread spectrum is convolving the received or replayed spectrum with a spreading function that is time-inverse with respect to the original spreading function. If BPSK modulation was used for applying the spread spectrum function, the output is a peak at the middle of the sequence of correlation values, the sign of such peak representing the value of the desired watermark signal information bit. According to the invention, in order to cope with echo distortions, two or more orthogonal spreading sequences are used at encoder side with the original or encoded audio signal in baseband. When applying the corresponding time-inverse orthogonal spreading sequences at decoder side, echoes that are longer than each one of spreading sequence's lengths can be fully removed. The spreading sequences applied can be modified at decoder side according to estimated echo delay values.

WO 2005/059913 A1